RISK & REWARD OF PRE-IRRIGATON FOR CROP ESTABLISHMENT

PROJECT PARTNERS

This project received funding from the Australian Government's Future Drought Fund

Key takeaways

- **Timing pre-irrigation is a balance. Pre-irrigation allows early sowing and stronger establishment but carries risks if rain follows, especially on heavy soils.**
- **Pre-irrigation works best if matched with the right variety—fast (short season) spring wheats sown too early can suffer yield loss.**
- **Water prices are highly variable. The economics of pre-irrigation depend on water availability, crop choice, and expected returns.**

Pre-irrigation, usually applied in February or March, fills the soil profile ahead of sowing to trigger germination and store enough moisture for the first 2–3 months of growth.

The main advantage is timing. Pre-irrigation gives growers the flexibility to sow early, particularly with longer-season wheats, and still target an optimal flowering window. It also spreads the sowing workload, reducing pressure in April–May.

A pre-irrigated profile also encourages early weed germination, allowing for an effective knockdown before sowing. With warm soils, pre-irrigation can also enhance nitrogen mineralisation ahead of sowing.

Timing and irrigation method

Timing pre-irrigation is a balance. Too early, and surface moisture can be lost before sowing. Too late, and follow-up rainfall can delay operations, increase waterlogging risk, or make the irrigation redundant. The goal is to wet the profile deeply enough and allow sufficient drying time so the paddock is trafficable at sowing without relying on a break event.

Surface irrigation (e.g., flood/furrow irrigation) can fill the soil profile in a single pass but requires large volumes of water (typically 0.75–2.0 ML/ha) and a long drying period, especially on heavy soils. Poor timing can delay sowing or cause excessive early biomass and lodging. Where water is supplied through regulated irrigation schemes that close between 15 May and 15 August, a full pre-irrigation may be the only option to ensure moisture through winter.

Overhead irrigation systems allow smaller, flexible applications closer to sowing, reducing total water use and waterlogging risk on lighter soils. However, they may not fully recharge subsoil moisture, leaving crops more vulnerable in a dry winter if no follow-up rain occurs.

Soil type strongly influences how effective and risky pre-irrigation can be. Heavy clays hold more water but drain slowly, increasing waterlogging risk. Improved paddock layout through raised beds, laser-levelling, or regrading can improve drainage and reduce sowing delays. Lighter soils (e.g. sandy loams) hold less water but drain quickly, making them better suited to partial wet-up strategies or overhead irrigation.

Pre-irrigated paddocks also create a green patch in an otherwise dry landscape, attracting kangaroos and rabbits.

Variety choice

Pre-irrigation only delivers value if matched with a suitable variety. Irrigated Farmer Network (IFN) trials showed that sowing standard spring wheats too early—following pre-irrigation—resulted in yield penalties of 0.8 t/ha in 2023 and 1.7 t/ha in 2024. In contrast, slow-developing or vernalised varieties maintained yield under the same conditions.

The risks of mismatching variety and sowing time are well known: early-sown short-season fast varieties (such as Vixen(ϕ), Calibre(ϕ), and Dozer(ϕ) CL plus) can reach flowering too soon, increasing frost risk and shortening the vegetative period. Warm soils also accelerate crop development, which can compress the photothermal quotient during the critical period, reduce yield potential, and increase frost and disease risk.

If pre-irrigation enables early sowing, it must be paired with a variety that can take advantage of that opportunity. Otherwise, growers risk lower yield and greater exposure to stress during key crop developmental stages.

Water availability and cost

In dry years with high water prices, some irrigators may achieve better returns by selling water rather than using it, particularly when crop margins are tight or seasonal risk is high. For those with secure water entitlements, the cost of pre-irrigation may be manageable. But for growers needing to purchase additional allocations, price volatility is a major consideration. Water prices can fluctuate from $40 to over $1000 per megalitre, making pre-irrigation a high-cost decision in some years. The economics depend heavily on the expected return per megalitre, crop choice, and whether pre-watering improves the chance of hitting yield and quality targets.

Southern Growers

Key messages

- **Pre-irrigation decisions need to balance water price, soil type, stored moisture and seasonal outlook.**
- **Pre-irrigation is not always the best option. Sometimes it is safer to wait and irrigate after sowing if summer rainfall has already built subsoil moisture.**
- **Soil moisture monitoring gives more confidence in deciding whether and when to pre-irrigate.**

George Stevenson farms 1,500 ha, around 15 km southeast of Jerilderie and is part of the Southern Growers group. Like many irrigators in the region, he manages both overhead and flood irrigation systems and is constantly weighing up the risks and benefits of pre-irrigating paddocks ahead of sowing.

‘For us, the decision to pre-irrigate depends on a few things—soil moisture, water price, expected allocation next year, and whether we think we’ll get timely rainfall to sow into,’ George says. ‘Sometimes it’s just about using water now, to store in the soil while it’s cost effective.’

In most years, George plans to pre-irrigate in February or March. ‘We build a water budget early in the season and assess moisture in February and March. This year we had 120 mm in December over seven days, which soaked in well, then 75 mm in March. That gave us enough subsoil moisture that we decided not to pre-irrigate.’

‘We’ve had years where we pre-irrigated and then got a wet autumn that made paddock access a real issue. Early waterlogging can hurt yield. So you’re always asking: am I giving this paddock 100 mm now, or later? Will that help or hurt? You hope for a dry enough start to get on and sow when you need to.’

Some soils are less suited to pre-irrigation. Black self-mulching clays, for instance, tend to crust after watering, making planting difficult. ‘This year we decided the moisture was there at depth, and the surface was dry, so we sowed and irrigated post-sowing instead,’ George said.

This season, George says the pre-irrigated paddocks on the farm are performing well. ‘They’ve had small rainfall events but were already sitting on good moisture, so they’re off to a strong start. Last year it was the opposite—crops got a bit too wet from pre-irrigation. You’ve got to be dynamic. Each year is different.’

George is part of a group of around 15 younger growers in the region.

‘The Finley trial site has helped shape the way we approach pre-irrigation,’ George says. ‘Particularly in showing how irrigation decisions affect crop development through to flowering. We don’t always go to the extension days—they sometimes clash with workload—but we review the results and talk about them a lot.The work carried out on the trial site is often a very good starting point to initiate conversation about how we manage our individual irrigation programs.’

Pre-irrigated Calibre wheat.

Photo: Russel Ford.

One takeaway from the trial work has been the value of better soil moisture data. ‘We used to rely on moisture spears and GDot (a simple visual soil moisture monitoring tool that gives a quick, indication of soil moisture status), but after seeing what was possible at Finley, we’ve moved to more advanced soil probes. It’s helped us improve how we schedule irrigation in-crop, and how we assess whether to pre-irrigate.’

George says the variety of irrigation layouts at the trial site is particularly useful. ‘They don’t just show results from an ideal system. They run flood and spray on different layouts, some more efficient than others. That makes it easier to compare to our own mixed systems and see where the risks might lie. For us the risk is of early waterlogging under wet autumn conditions.’

In recent seasons, that practical relevance has helped guide decisions. ‘This year was a good example. We had big summer rain—120 mm in December and another 75 mm in March. Looking at soil moisture and thinking back to trial years where crops were overwatered early, we decided not to pre-irrigate and instead irrigated after sowing. It’s a call we felt confident in partly because of what we’d seen play out at the site.’

However, the trial results aren’t always directly transferable. ‘The scale and timing at the site don’t always line up with how we operate. We’re not relying on contractors, so we can act quicker if conditions change. But the site still gives us a starting point. It helps validate our decisions or challenge our assumptions.’

Pre-irrigated Spartacus, sown May 4.

Photo: Bill Moar

Irrigated Farmer Network

Key messages

- **Pre-irrigation can give crops a stronger start in seasons with patchy rainfall, reducing the risk of poor establishment on heavy soils.**
- **Early pre-irrigation and sowing, particularly for legumes like faba beans, can deliver higher biomass and better groundcover.**

Bill Moar farms 1,200 ha east of Swan Hill, about 18 km over the NSW border. Around 500 ha of the property is flood irrigated, mostly on heavy clay and clay loam soils typical of river silt country. Average annual rainfall is around 320 mm, but distribution is patchy and unpredictable. Although irrigation is a key part of the system, 2025 was the first year Bill tried pre-irrigation.

‘I started out avoiding pre-irrigation because it uses more water upfront. And honestly, most years we’ve been able to get crops up without it. But if you get a small, late break, especially on the heavier soils, it’s not enough.’

Bill flood irrigates and doesn’t yet use soil moisture probes, though he’s looking into it. For now, he assesses moisture using a steel spike to see how far it penetrates the soil profile. That spike, along with a cautious seasonal outlook, played a key role in his 2025 decision to pre-water.

The call to pre-irrigate was made in early April. He'd delayed pasture watering due to a run of hot weather, then received a decent rain in mid-March. It gave him some hope, but not enough to rely on. He didn't have much confidence in good rain for the season, and his soil moisture assessment suggested the soil could do with a pre-irrigation to support the crop.

With warm conditions, the paddocks dried down fast, good enough to get back into the paddock just 8 days later to begin paddock preparation. ANZAC Day delivered another 45 mm, and by 4 May, the crop was in.

Bill is a private diverter with access to both general security and supplementary water. Unlike system water users—who rely on water delivered through public irrigation channels and face scheduled shutdowns from 15 May to 15 August—private diverters can pump directly from rivers or channels using their own infrastructure, giving them far more flexibility with the irrigation schedule.

'If I was on system water, I'd be pre-irrigating every year to get 100–150 mm stored in the profile,' he said. 'But as a diverter, I can run it down to 50 mm and still irrigate at three-leaf stage if I need to.'

Reviewing this year and plans for next year

For Bill, pre-irrigation in 2025 was a clear success. He only pre-watered the barley paddocks, assuming there was enough moisture for the faba beans. 'I wished I'd done the faba beans too—I thought there was enough moisture, but things dried out faster than I expected. They're looking thin at the moment.' He notes that the areas not pre-irrigated have 'been a disaster.'

Looking ahead to 2026, Bill plans to pre-water earlier, especially for legumes, while continuing to rely on rainfall for canola, which can be harder to establish under flood irrigation due to surface hard-setting. As someone who came from a dryland background, he's still refining his irrigation strategy—balancing seasonal uncertainty, water cost, and crop responsiveness.

'This year was unusual. Warm between patchy rains, long gaps between falls. It really highlighted how fast things dry out. I've always aimed for a low-risk system—get a crop up, get it going. Pre-irrigation helped me do that this year.'

Demonstration site

Bill visited the IFN demonstration site at Kerang, in the northern Victorian Murray Valley, where pre-irrigated faba beans had been sown at different timings from March through to mid-June. The visual differences in early groundcover and crop development were striking—but what stood out most was how one grower was consistently achieving 5–7 t/ha faba bean yields using early sowing and pre-irrigation.

'It absolutely changed my thinking,' Bill said. 'I met a bloke who pre-waters his faba beans every year. He's on system water, so he has to pre-irrigate, and his soils are different to mine, but the results were hard to ignore. He gets the crop up early, gets early groundcover, more biomass, and more organic matter back into the system.'

While the economic margins on faba beans were a major drawcard, Bill also saw the rotational value, particularly the nitrogen contribution from returning high-biomass legumes to the soil.

A faba–canola–barley rotation is now firmly on his radar. With the returns on offer, he sees merit in buying a small volume of additional water if needed. 'You can pay a little to top up your water and add it to the title over time—it's not a big burden if the margins are there.'

This year, he'd hoped to get the faba beans away without irrigation. Next year, he plans to do it properly: early pre-watering—potentially twice—and sowing faba beans by early April. 'It was pretty obvious that the early sowing was the way to go,' he said. 'Especially for us, where we usually have hotter springs.'

The project, "*De-risking the seeding program – Adoption of key management practices for the success of dry and early sown crops*" was led by Ag Excellence Alliance. It combined research and on-farm experience to support earlier and more strategic sowing decisions to build drought resilience. The project draws on the expertise and local knowledge of fourteen grower groups across the grain producing regions of South Australia, Victoria, New South Wales and Western Australia. Scan the QR code to find out more.